

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF : Naoki SHUTOH et al.  
SERIAL NUMBER : USA Patent Application No. 10/629,624  
FOR : THERMOELECTRIC MATERIAL AND  
THERMOELECTRIC ELEMENT  
FILED : JULY 30, 2003  
GROUP ART UNIT : 1795

DECLARATION UNDER 37 C.F.R. 1.132

Hon. commissioner for patents and trademarks  
Washington, D.C. 20231

Sir:

1. I am an inventor of the present invention described and claimed in the above-identified application and reside in 3-10-18, Baba, Tsurumi-ku, Yokohama-shi, Kanagawa-ken, Japan.

2. I graduated from TOHOKU Univ. in March 1987. I was employed by TOSHIBA in April 1987, and have been engaged in research on the thermoelectric materials.

3. The fine grain sized Ti powder, Zr powder, Hf powder, Ni powder and Sn powder are prepared as raw materials. By using these raw material metallic powders, a sintered body having the same composition as shown in Example I-9 of the present invention is obtained by the method of Shen et al. As described in Shen et al. at page 166 second paragraph under the Experimental Techniques, the method includes spark plasma sintering. Namely, the method of Shen et al. does not include melting raw materials to obtain melted raw materials, quenching the melted raw materials to obtain an alloy formed of a metallic lump, or pulverizing the alloy.

The dimensionless figure of merit ZT of the obtained sintered body at a temperature of 300K is calculated in the same manner as described in the embodiments, and the result is 0.04.

As shown in Table 1 of page 36 of the original specification, the dimensionless figure of merit ZT of the sintered body shown in Example I-9 of the present invention is 0.08. As described in page 34, line 27 to page

35, line 4 of the original specification, the sintered body shown in Example I-9 is manufactured in the same method as used in Example I-1. That is, the method is that described in page 30, lines 14 to 27. It is clear that in the method, melting raw materials to obtain melted raw materials, quenching the melted raw materials to obtain an alloy formed of a metallic lump, and pulverizing the alloy are performed before sintering.

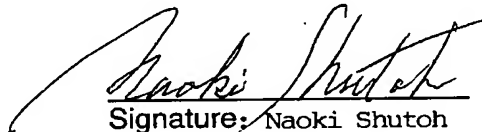
The dimensionless figure of merit  $ZT$  of the sintered body obtained by the method of Shen et al. is only a half of that of the sintered body of Example I-9 of the present invention.

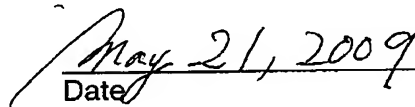
That shows that the sintered body obtained by the method of Shen et al. is inferior to that of the present invention in the thermoelectric characteristics, even if the sintered body has composition same as that of the present invention.

As we stated in the Remarks filed on April 14, 2008, it is assumed that the sintered body obtained by the method of Shen et al. is inferior to that of the present invention in the dimensionless figure of merit  $ZT$  since the amount of oxygen included in the sintered body as impurities is greater than that of the present invention.

That is the evidence of the difference in the products obtained by the different process steps.

The undersigned petitioner declared further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

  
Signature: Naoki Shutoh

  
Date